

# COST *and* MANAGEMENT

VOL. XXV

SEPTEMBER

NO. 8

## PLANT PROBLEMS AND THEIR SOLUTION

By K. A. Jackson ..... 282

Mr. Jackson was born in Pincher Creek, Alberta. After some experience as part-time announcer in radio station CKVA, and three years as Service Manager for Taylor & Pearson Ltd., Edmonton, he joined Canadian Marconi Company as Development Engineer. In this capacity he served as head of the Special Production unit on an extended Military Contract and as Assistant to the Engineer in Charge of Development. He served a year as a full-time member of Company Post War Planning Committee. He became Planning Department Superintendent and later Production Manager and now holds the position of Manager of the Radio and Appliance Division, which designs, produces and sells broadcast and television receivers and similar equipment.

## THE NEED FOR MONTHLY COST AND PLANT MANAGEMENT SESSIONS

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Mr. Henderson was born and educated in Aberdeen, Scotland. After coming to Canada, he joined the Great Northern Railway of Canada, as Accountant and Cashier. From 1910-17 was Secretary-Treasurer of J. P. Mullarkey, Limited, Railroad Contractors. After a short period as Supervisor of Stores, Imperial Munition Bds., Shipbuilding Department, he was appointed Comptroller, Wayagamack Pulp and Paper Co. Ltd. which position he held until after 1929, after which he was appointed Comptroller, Canada Power and Paper Corp., which is now Consolidated Paper Corp. Ltd., and in 1945 was appointed Vice-President and Comptroller, the position which he now holds.

## THE ROLE OF RESEARCH IN INDUSTRY

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Mr. R. H. Rimmer graduated from the University of North Carolina as a B.Sc. in Chemical Engineering. He joined the Aluminum Company Organization in 1922 and was later appointed Vice-President and Director of Research, Aluminum Laboratories Ltd. This Company operates laboratories in Arvida, Quebec, Bambury, England and Kingston, Ontario. Mr. Rimmer is Chairman of the Board of Directors of the Canadian Institute of Chemistry.

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# SOCIETY NOTES

## **VANCOUVER TO BE SCENE OF 1952 CONFERENCE, HALIFAX — 1953**

Members who stopped over in Vancouver and Victoria enroute to the 1949 Conference in Banff still have vivid recollections of the hospitality accorded them by the Chapters on the West Coast. It is therefore quite understandable that the invitation of the B.C. Society to hold the 1952 Conference and Annual Meeting in Vancouver was quickly accepted. It has just been announced that the dates have been set for June 24, 25 and 26. Headquarters will be in the Hotel Georgia while rooms have also been reserved in the Hotel Vancouver. To most of our members Vancouver is far, far away, but we can say from experience that the trip will be worth every mile of the distance.

At the Annual Meeting in Ste. Adele, Charlie McFadden, President of the Nova Scotia Society extended an invitation to hold the 1953 Conference and Annual Meeting in Halifax. The invitation was unanimously accepted whereupon the Nova Scotia delegation (and it was a big one) immediately commenced their publicity campaign. They let it be known to all and sundry, that no matter how good previous conferences had been, the 1953 conclave would be better.

## **STUDENT AWARDS FOR CANADIAN-WIDE COMPETITION ANNOUNCED**

At the meeting of the Co-ordinating Educational Committee held in Ste. Adele, it was announced that two of our past presidents — Mr. D. R. Harrison and Mr. H. M. Hetherington had kindly offered to provide, annually, gold medals to students receiving the highest marks in the Society's final examinations. A sub-committee was appointed to draw up the regulations governing these awards, and their report will be published when it has been approved.

## **IN THIS ISSUE**

In this issue of Cost and Management are published the first two papers presented at the 30th Annual Cost and Management Conference. The remaining four papers given at the Conference will appear in the October and November issues.

## SOCIETY NOTES

### **FREDERICK G. COBURN and KENNETH H. ORR**

It is with deep regret that the Society of Industrial & Cost Accountants of British Columbia announces the deaths of Mr. Fred G. Coburn and Mr. Kenneth H. Orr, both Past Presidents of the Society.

Mr. Coburn was regional administrator of the office of the comptroller of the Federal Treasury Department. He was a charter member of the Society and played a very prominent part in its organization and subsequent incorporation. His active interest in Society affairs continued to the time of his death. To his widow and daughter the members of the Society extend their heartfelt sympathy.

Mr. Kenneth H. Orr was assistant to Mr. Coburn and was appointed to succeed him as regional administrator. He too, was a charter member of the Society and was the immediate past president. Mr. Orr was also a member of the executive committee of the Canadian Society and was present at the meeting of the committee in Winnipeg. His services to the Society have been outstanding and have contributed much to its success. To his widow and family, the members of the Society extend their sincere sympathy.

### **UNIVERSITY OF SASKATCHEWAN DEPARTMENT OF EXTENSION OFFERING R.I.A. EVENING LECTURE COURSES**

The University of Saskatchewan, Department of Extension in co-operation with the Society of Industrial and Cost Accountants of Saskatchewan and the College of Commerce is offering evening lecture classes in the Primary and Intermediate subjects to prepare students for the Society's examinations.

Classes will commence in October and will be held at the University of Saskatchewan, Saskatoon, Regina College, Regina and The Technical High School, Moose Jaw.

The Department of Extension, the College of Commerce and the Educational Committee of the Saskatchewan Society have been working in close co-operation for several months to make this undertaking possible. A very attractive pamphlet announcing the classes has been given wide distribution and should attract a large registration.

## NEW MEMBERS

### NON-RESIDENT ALBERTA

R. W. Hanson, Imperial Oil Limited, Norman Wells, N.W.T.

### VANCOUVER CHAPTER

D. Bennett, Canadian Mobile Co. Ltd.

C. G. Francis, 4130 Slocan St., Vancouver, B.C.

R. M. Western, Sun Publishing Co. Ltd.

Bryon Lund, Johnston Terminals Ltd.

Mrs. Jean J. Sawicki, 4140 Douglas Rd., N. Burnaby, B.C.

### NON-RESIDENT BRITISH COLUMBIA

J. D. Jecks, C. M. & S. of Canada Ltd., Trail, B.C.

### WINNIPEG CHAPTER

C. J. Chapman, Canadian Salt Company Ltd., Neepawa, Man.

### MONCTON CHAPTER

J. H. Harper, Hudson, McMackin & Company

### HALIFAX CHAPTER

R. W. Zinck, Lunenburg Sea Products Ltd.

### BAY OF QUINTE CHAPTER

J. C. McDonald, Bank of Montreal, Belleville, Ont.

### KINGSTON CHAPTER

H. C. Westcott, Canadian Locomotive Co. Ltd.

J. Lawrence, Canadian Locomotive Co. Ltd.

### KITCHENER CHAPTER

G. T. Parsons, Penmans Ltd.

R. A. Schnarr, Fiberglas Canada Limited, Oshawa, Ont.

### LONDON CHAPTER

T. J. McCullough, Kellogg Co. of Canada Ltd.

### NIAGARA CHAPTER

J. H. Dorsey, John Deere Welland Works, Welland, Ont.

F. H. Smuck, The H.E.P. Co. of Ontario

### OTTAWA CHAPTER

J. H. Wark, Frost & Wood Co. Ltd., Smiths Falls, Ont.

Milton Owens, Jr., J. H. Connor & Son, Ltd., Hull, Que.

### TORONTO CHAPTER

J. F. Barrett, Continental Can Co., New Toronto, Ont.

E. W. King, Dunlop Tire & Rubber Co.

W. G. Willis, 7 Maynard Ave., Toronto, Ont.

Miss M. B. Chmel, Prencos Progress & Engineering Corp. Ltd.

Raymond Dobkin, Tip Top Tailors

G. H. Connolly, Frigidaire Products of Canada Ltd.

### WINDSOR CHAPTER

A. F. Bullard, Marnoch Office Supply Co.

### MONTREAL CHAPTER

L. A. Lamarche, The Readers Digest Ass'n. Ltd.

### NON-RESIDENT NEW BRUNSWICK

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# C & M ROUND-UP

By N. R. BARFOOT, R.I.A.

## WORK WEEK — PLANT AND OFFICE

The normal work week for plant employees in Canada averaged 44¼ hours in 1950. This is approximately one-third of an hour less than the year before. Seventy per cent of the employees are working 45 hours a week or less and 30% about 40 hours. Sixty-five per cent of Canadian manufacturing workers were on a 5-day week in 1950.

The normal work week for office employees in the manufacturing industries averaged 38¾ hours during 1950, one-quarter of an hour less than the previous year. Forty-seven per cent of office workers were working 37½ hours a week or less, and more than 83% were working 40 hours or less. Twenty-seven per cent of this class of employees were on a definite 37½ hour week. Twenty-two per cent were on a 40 hour week. Seventy per cent of the entire group were on a 5-day week in 1950, an increase of 4½% over 1949.

## FARM FIGURES

Total Cash Income for 1950 .....	2,225 million
Income in Kind .....	337 million

Cash income down 11% from 1949 figure

Net Income for 1950 .....	1,461 million
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A decline of 10% from 1949 and 12% from record high in 1948.

Decrease in net was due to a substantial decline in cash income, a smaller value of income in kind and an advance of farm operation expenses and depreciation charges by 6% over 1949.

## PENSION TAX?

With huge budget surplus indicated there is some doubt about the taxpayer having to pay the planned 2% tax to take care of pensions. The pensions fund probably will be earmarked from additional tax revenue accruing since last April.

## BUDGET SURPLUS

To date, this amounts to over 300 millions attributed to:

*Corporation Tax Yield* — Collections in this area are climbing. At present levels yearly take will be over the billion figure.

*Customs Revenues* — Budget estimator called for 315 million annual from this source. Present income indicates an extra 50 million by end of Government year.

*Defence Spending* — The Government program for a 5 billion expenditure over the next 3 years meant an arbitrary split of about 1.7

## C. & M. ROUND-UP

billions for this year. Certainly this program isn't in high gear yet and may not be by year end, at least to the tune of 1.7 billions. Some of the present surplus may be trimmed off then by late year defence spending.

In any case, the estimated surplus of 30 millions for the entire year will be on the low side by 10 or 15 times.

## REFINERIES AND OIL CONSUMPTION

Canadian consumption has doubled in the last ten years and is currently increasing at the rate of 10 to 12% per annum.

The increased consumption is revelling in increased refining capacity.

With the addition of the new Sun Oil plant at Sarnia, Ontario, in '53, Canada's refining capacity will be 460,000 bbls. per day.

## MUNICIPAL FINANCING

Since war end most municipalities have been attempting to catch up on the capital expansion deferred during the thirties and forties. The increase in urban populations and expansion of manufacturing facilities and new industry have added to the problem of selling more and more city debentures.

Prior to 1939, debenture bonds were selling at a cost to the community of from 4 to 6%.

In 1946 money was plentiful, demand for municipal bonds high and interest rates dropped to below 3% with the result that municipal financing of a capital nature was easy.

A tightening of credit this year, particularly through bank loans has forced the Canadian towns and cities to sell their debentures first instead of arranging bank loans and paying it off through bond issues at a later date.

The big investors in urban debentures, the insurance companies are putting the brakes on this type of investment in order to help on the over-all restrictive credit program and besides are able to buy only out of a limited amount of funds due to a depressed market for war bonds.

There has been increasing difficulty in the unloading of new issues, an increase in interest rates to over 4% and a great increase in the sale of bonds in the U.S. — twice as many this year as in 1950.

The going is tougher, therefore, for city councils in their post-war capital expansion programs. The rates are higher and the investment houses are more selective.

## ST. LAWRENCE SEAWAY

With the recent rejection of the Seaway Program by the U.S. Congressional Committee, the possibility of Canada doing the job alone has arisen.

Here are a few of the statistics on this venture:

Estimated Cost .....	850 million
Time to Complete .....	5 years for power; 8 years for shipping
Power Developed .....	5.5 million h.p.
Materials Used	
Reinforcing Steel .....	70,000 tons
Structural Steel .....	108,600 tons
Copper .....	4,400 tons

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Cement .....	7,630,000 bbls.
Lumber .....	118,700 m.b.f.

All in all, it is a tremendous job for Canada alone. We do need the power, however, and there is every chance of good return on the investment, particularly if transportation of Labrador ore becomes a big factor in East to West shipping in the next few years.

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## Current Articles of Interest to Industrial Accountants

**THE ACCOUNTANT'S RESPONSIBILITY FOR THE REPORTING OF EVENTS OCCURRING SUBSEQUENT TO THE BALANCE SHEET DATE** — by Joseph A. Wiseman, C.P.A., The New York C.P.A., July 1951.

**INTERNAL CONTROL AND THE INTERIM AUDIT** — by Joseph Recht, C.P.A., The New York C.P.A., July 1951.

**THE ASSIGNMENT OF NON-MANUFACTURING COSTS TO PRODUCTS** — N.A.C.A. Bulletin, August 1951, Sec. 4.

**CASE STUDIES IN AUDITING PROCEDURE** — American Institute of Accountants, Number 9.

**THE COST ACCOUNTANT'S CONTRIBUTION TO PRODUCTIVITY** — by Sir Charles Bartlett, The Cost Accountant, July 1951.

**ALLOCATION OF OVERHEAD COSTS — A SHORT-CUT** — by W. H. Franklin, N.A.C.A. Bulletin, August 1951, Sec. 1.

**WORK UP A SOUND BURDEN RATE — THEN TEST IT** — by J. A. Campbell, N.A.C.A. Bulletin, August 1951, Sec. 1.

**CONTROL OF INVENTORY CONSIGNED TO ESUPPLIERS** — by C. W. Bendel, N.A.C.A. Bulletin, August 1951, Sec. 1.

**FRINGE LABOR COSTS IN THE PACKING INDUSTRY** — by Cletus P. Elsen, N.A.C.A. Bulletin, August 1951, Sec. 1.

**PRICE ESTIMATING — SURVIVAL FACTOR IN JOB SHOPS** — by Frank S. Howell, N.A.C.A. Bulletin, August 1951, Sec. 1.

**INVENTORY MANAGEMENT "KNOW-HOW"** — by Harold E. Bliss, N.A.C.A. Bulletin, August 1951, Sec. 1.

**NEW PRODUCT PROCEDURES IN A SMALL COMPANY** — by Sheldon L. Page, N.A.C.A. Bulletin, August 1951, Sec. 1.

**CHARACTER AND ABILITY MAKE A GOOD COST MAN** — by Alan A. Slade, N.A.C.A. Bulletin, August 1951, Sec. 1.

**CURRENT USEFUL CONCEPTS OF DEPRECIATION FOR FIXED ASSETS** — by Chas. W. Smith, C.P.A., The Journal of Accountancy, August 1951.

## ADDRESSES OF PUBLICATIONS

American Institute of Accountants, 270 Madison Avenue, New York 16, N.Y.

The Cost Accountant, 63 Portland Place, London W-1, England

The Journal of Accountancy, 270 Madison Ave., New York 16, N.Y.

N.A.C.A. Bulletin, 505 Park Ave. (fourth floor), New York 22, N.Y.

The New York Certified Public Accountant, 677 Fifth Avenue, New York 22, N.Y.



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## Plant Problems and Their Solution

By K. A. JACKSON, B.Sc. (E.E.), M.Sc.

Manager, Radio and Appliance Division, Canadian Marconi Co.

While the solution to many problems in business administration can be found in the development of efficient systems and procedures, the success of such plans is governed entirely by the people responsible for their implementation. The author presents some of the more prominent problems in plant management and then deals with their underlying causes and solutions.

When the request was made that I should undertake this address it at first appeared somewhat incongruous that an Engineer by training should endeavour to discuss a subject such as "Plant Problems and Their Solution" before an audience with basically an accounting background. However, after tentatively agreeing I "slept on it" and found that the subject was most appealing and that I felt that it was one on which I wanted to say something. I trust, gentlemen, that what I want to say will be of some interest and that you can find your way clear to agree with at least some portion of my feelings.

It is customary amongst a large group of rather regular speakers to commence with a "Text" — now I do not want to be accused of copying these eminent gentlemen, but I would like to read a couple of quotations which, although not exactly apropos the subject if only slightly paraphrased, still retain, I feel, the philosophy of their authors and yet when so modified appear to me to be of vital importance in the topic I have been asked to discuss.

The first of these in the form originally stated by an author unknown to me is:

"Socialism will only work in a community of angels and in a community of angels socialism would not be necessary."

The changes in this quotation to suit my purpose to-day require the substitution of the word "systems" for "socialism" and probably the addition of "smoothly" after "work" resulting in:

"Systems will only work smoothly in a community of angels and in a community of angels systems would not be necessary."

## PLANT PROBLEMS AND THEIR SOLUTION

It is rather a coincidence that I happened to run across my second plagiarism the evening referred to previously when I was debating the wisdom of the acceptance of this opportunity of speaking to you. It is a statement in Bernard Baruck's Plan for a Full Life reading:

"and last, but most of all, we must remember never to become to statistical where human beings are concerned. The problem of what to do about the aged is primarily one of recognizing them first as individual human beings — full of fears, hopes, despairs and appetites. **WE CAN'T REGULATE THEM ACCORDING TO METERS.**"

In this quotation, I feel we only need to change one word — that is, "people" for "aged".

You may well feel that I've taken more than enough time to get to the point, but my point is that *"Plant Problems and Their Solution"* might well be changed to read *"The Problems of People — People Working Together and Their Solution."*

Observations of a general nature in industry lead me to feel that Plant or People Problems in the Electronic Industry attain a rather unusual eminence due possibly to the combination of several circumstances.

(1) It is a new — romantic industry and is thus extremely competitive.

(2) It is an industry of annual models in the Broadcast Receiver and Television Phase or rapidly changing techniques in its more complicated phases such as Radar and Geigar counters.

(3) It is basically design and assembly in its operations rather than fabricative or converting and as such involves the specification, ordering and *timely* accumulation of a large number of different components. It is seldom realized that the production of the smallest radios requires some 200 different items ranging from rivets at one extreme to loudspeaker and cabinet at the other.

And, lastly, the assembly of any radio equipment is entirely a hand operation thus opening many opportunities for personal error. This, of course, requires not only a 100% visual inspection, but a sequence of electrical adjustments and tests to ensure a satisfactory level of quality in the finished product. In the field of accounting it is possible by various methods of balancing to ensure at a reasonable cost a high expectation of perfect accuracy. Unfortunately such a happy condition is not feasible

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in the manufacture of radio as well as many other items — no test whatever can show up a poorly soldered connection, but it will turn up in time (one year, two years, perhaps never) as a most annoying intermittent fault in your radio which will require the utmost skill of a good repairman. A high standard of workmanship and good visual inspection can never eliminate such conditions but can only minimize them and never can we be sure that every set is truly perfect.

It is seldom that one reads any of the many good periodicals dealing with manufacturing but one encounters subjects such as "Standard Costs", "Method Time Motion", "Statistical Quality Control", etc. Many of these articles are of absorbing interest and are extremely valuable. However, on many occasions in reading them. I have had a sense of dissatisfaction which, after more prolonged consideration, seemed to arise from a neglect of the fact that the means of implementing the procedures advocated inevitably involve human beings with all their failings. An illustration of this I'd like you to consider the following incident — our cost system was revised last year in accordance with the best of modern practice by a group of well qualified people and seemed capable of producing figures of adequate accuracy. However, recently a rather significant loss was indicated on one production order, — various circumstances indicated that such a loss was not conceivable so a careful investigation was instituted with most interesting implications. The cause was, of course, a human error, but not in the job cost system — it arose from the duplication of paper work in a material release from stores. In other words the accounting system can be no more accurate than the information it is fed. However, I submit that the system has not fully considered the human element. Naturally this loophole is being covered although it is not easy to do so without becoming involved in unnecessarily expensive procedures.

It now seems appropriate to examine some of the more prominent so-called Production Problems, — in so doing I feel I must neglect those problems arising from the artificial conditions due to the present emergency conditions because (it is to be hoped) such are of a temporary nature only. Furthermore, it may well be argued that these conditions tend only to exaggerate the problems present at all times. It is proposed to indicate these problems in the order in which they appear to affect

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the Radio Industry most seriously — I feel sure that the same problems arise in other industries, but probably their order of magnitude will vary. I suggest a fairly comprehensive listing would comprise (I plan to discuss them individually later).

- (1) Material shortages
- (2) Material errors
  - (a) Occurring inside your own company, OR
  - (b) Occurring outside your own company, i.e. from a supplier
- (3) Defective workmanship
  - (a) Inside the company OR
  - (b) By a supplier
- (4) Defective machinery or other equipment
- (5) Use of the wrong or inadequate equipment or machinery
- (6) Lack of control information
- (7) Troubles which can quite readily be classed as "Personnel" problems such as slow-downs and sabotage.

You will observe in this listing full advantage has been taken of the limitations of the subject on which I have been asked to talk in that the narrowest interpretation of the word "production" has been taken. This has not been done by way of evasion as it will, I hope become evident that such problems as production planning, time standards, cost control, etc., are subject to the same underlying causes and "solutions".

## MATERIAL SHORTAGES

Now to examine in some detail each of the problems let us consider first the question of Material Shortages. Now just think of those two words — is the basic trouble a material shortage now when we are in trouble or did the trouble originate 4, 5-6 months ago when such condition logically could have been foreseen and corrective measures applied at that time? It is true that volume controls (if we're talking radios) are "always" obtainable in 2 to 3 months it is probably also true that every other individual item has a normally well defined delivery period, but is it not also reasonable to assume that once in a while a supplier of one of those two hundred odd items needed to build a radio will have a "Production Problem" himself and is not the sound solution to this the allowance of a more adequate time between the scheduled arrival of material and the start of production? Yes, but what of those industries using

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only a few items from external sources — I can remember near the town where I was born and raised a saw mill going bankrupt because of a shortage of their one material supply — trees — could not that have been foreseen? No doubt many more examples will occur to you individually, but can they truly be called “material shortages” — it is my submission that a more basic and a more accurate wording would be “Inadequate Planning”.

It is often argued that the competitive conditions in the industry do not permit of longer periods before “Production” starts, but if this is so it seems strange that your competitors are marketing their product while you have a “material shortage”. Even in that most futuristic business — Invention — it seems more than coincidence that Edison and Swan invented the filament type electric lamp within a period worthy of litigation. Few inventions indeed are free from some doubt as to who was first. Inevitably, of course, there are occasions when no amount of foresight that could reasonably be applied can avoid a shortage of material — “acts of God” such as the roof being blown off the factory of one of our cabinet suppliers still occur. However, if all instances of lack of “Adequate Planning” are examined I’m afraid that the score against the Planner will not be too good. If we concede that our competition forces short production periods cannot our Planning be directed in other directions such as towards the more extensive use of a standardized type of part that can be bought for stock or towards a type of material less subject to supply disruptions. Pre-war the radio industry was dependent on a rather spasmodic supply of mica of suitable electrical qualities — a condition which became more grave at the peak of hostilities. Within the last few days there has been announced the culmination of the “Planning” of The Corning Glass Company in that they are now producing glass ribbon which not only will (by report) produce a better condenser, but will eliminate completely the reliance on an unstable source of supply.

There are few people indeed who do not readily admit the need for “adequate planning” — why is it then that material shortage is always with us and at the present time is one of the major topics of conversation. It is my contention that at the appropriate level lip service only is being given to its need, — in other words the person in control has not truly accepted the facts that product styling, engineering and draughting must have

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their full time; that full time plus contingency must be provided for the procurement of material and above all that a bit extra is required to do *all these well*. In 1945 it was the avowed Government policy in Canada and the United States that certain critical materials should be "stockpiled" in times of plenty to prepare for another emergency, yet in 1951 we see a wild scramble for, amongst other things, aluminum in spite of the fact that for several intervening years aluminum production was severely cut back. The most emphasized reasons advanced for this evidence of lack of adequate planning have to do with the desirability of reduced Government expenditures, lower taxes, etc., yet I cannot recall the Prime Minister of Canada or the President of the United States going on the air to try to convince the public that the collection of a small percent extra in taxes for this purpose was vital to our future. Nor can I recall any similar appeal for public support for any as yet non-existent limitations on concentrations of population and industry which are needed to render us as nations less vulnerable to atomic bombs and to the temptation of some aggressor to use them. This in spite of repeated public statements of high military and scientific figures that such decentralization is the only real defence and deterrent. It seems obvious that lip service only is being given here. I have used these two examples to emphasize the need in industry for the whole-hearted and active recognition of the need for adequate planning at the top of a company as the old adage "example is the best teacher" still seems sound.

## MATERIAL ERRORS

Material Errors is the second classification and is subdivided into those occurring within and without the company. By this classification I mean that the parts, raw material, etc., which have been obtained for the job do not meet the appropriate specification. For my purposes I would include here those items which did not arrive on time due not to a basic lack of time for ordering, but the fact that at some stage of the proceedings someone omitted to cover their needs in bills of material or purchase orders, etc. As regards these errors, after a particularly disruptive one has been discovered there is often a tendency to take a very discouraging view of your staff's performance — in such cases it is most refreshing to review the Inspection Reports on incoming material. After a recent session of such type I was persuaded that our staff was most admirable



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especially when it was discovered that an air cargo shipment of some special cables arrived after holding assembly for four days only to discover that our supplier had shipped the wrong type which would not be needed for several weeks.

Detailed analyses on many such of these errors would seem to indicate that to a degree it is possible to obtain relatively good control by revising methods and instituting various systems of cross checks. However, it is apparently disgustingly easy to arrive at prohibitively costly procedures. As an aside, I should like to mention that the most effective measures I have run across are based on the elimination of recopying material lists — taken to the extreme this would entail the engineers and draughtsmen writing the purchase orders — a matter of some difficulty in most companies — it is interesting to note that at the time work on these lines was proceeding, some sales literature for an accounting system came to hand which made this feature its important point. While the need for system revisions in some of these cases cannot be deprecated, it has seemed apparent at times that the attempts to so avoid personal errors has resulted in systems far too cumbersome and expensive, and a point is eventually reached where system revisions cannot be counted on for further improvements. For example on the simple operation of preparing a purchase order from a bill of material there appears to be no method whereby accuracy can be ensured except by "checking" the work and in this respect how often have we seen a check mark beside an incorrect entry — psychologically it seems logical to anticipate that if a large percentage of the work being checked is correct the checker's mind will wander and the check marks become automatic. It thus appears that the solution of this problem cannot be attained in any easy manner.

With reference to Material Errors occurring outside of your company, there is, of course, little that can be done constructively, the usual recourse being to seek a more reliable supplier if the faults are excessive. I would like to maintain, however, that much can be done to minimize the impact of such errors by recognizing in our Planning that regardless of our choice of suppliers perfection is seldom attained.

You will have noticed that up to now I seem to have forgotten the "and Solutions" part of my subject. I do intend to cover this, but my intent at the moment is to try to reduce all of these problems to a common factor — "people" and to at-



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tempt to demonstrate that this factor would appear to offer the most fruitful possibilities of solutions of Production Problems. Before attempting this I must, of course, continue with the balance of the problems outlined.

### DEFECTIVE WORKMANSHIP

With reference to the next classification — Defective Workmanship, it is, of course, self-evident that this is completely due to "people" and their only too human failings. In passing, however, it seems advisable to mention a procedure which on two widely separated occasions had rather dramatic results — the most recent occasion being during the widely experienced slump in quality of work immediately following the war — the other being considerably pre-war. Basically the procedure is in most instances quite simple as it merely involves arranging in the case of radio assembly operations for the inspector to pass to the immediate supervisor of the assembly line each defective set. The Line Supervisor then displays the fault to the operator responsible and marks the fault classification on a card in front of the operator's position. A weekly recording of the total is subsequently entered as a part of the employee's record. In both these rather widely separated instances the application of this procedure produced rather dramatic results in the reduction of inspection faults by a factor varying between twenty and one hundred to one and at the same time production actually increased. Somewhat unexpectedly on both occasions the procedure met with favour of the Unions involved and in one case the Union intimated that a poor quality record might well offset to some extent seniority. In a rather small number of instances it was found that the employee was apparently unable to attain a standard of workmanship which was acceptable — transfers were, of course, inevitable. I am convinced that the success attained in these cases is basically due to the speed with which the error could be drawn to the attention of the person involved — the time interval being under these circumstances between 5 and 30 minutes. It is seldom in clerical or accounting functions that such speed of error detection can be attained, but from some very tentative investigations it would appear that the knowledge that an actual record of errors is being kept in addition to the normal assessment of performance has had favourable results. To this point I wish to make reference later.

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### **USE OF MACHINERY AND EQUIPMENT**

In respect to the use of defective machinery or other equipment, my fourth classification — I wish to dismiss this with the statement that except when the equipment is new and thus may suffer from so-called inherent defect it is seldom indeed that the trouble cannot be traced to the failure of some person to carry out his maintenance responsibilities. In other words usually people are at fault.

Much the same applies to classification five — the use of inadequate equipment or machinery. In some cases it is frequently argued that circumstances have forced the use of such, but I'm afraid if such cases are examined analytically that most such instances arise from the lack of "Adequate Planning" and almost the entire balance are the result of personal error somewhere along the line. An instance comes to mind where in the production of a certain radio a cam of high accuracy was required. This could only be produced by an extremely expensive tool unwarranted by the quantity to be produced or by the use of a Gorton Duplicator — a tool room machine, far removed from "production" techniques. The diagnosis in this case appears to be a "personal" error on the part of the mechanical designer in not ascertaining that a technically good idea was practically feasible for the quantities involved.

### **CONTROL INFORMATION**

The problem of "lack of control information" appears almost at the last — possibly it should have appeared earlier. However, I do not believe this is significant as it would seem that if such a condition exists it must be due to one of two conditions — either the person who needs the information is not aware of his need or that the supplier of such data — in general the Cost Accounting or Scheduling Group are not wholeheartedly convinced — and I mean this with its fullest implications — of the need for supplying it *on time*. In other words I wish to attribute this "problem" to people to reduce my problems to a common level.

With respect to the final item referring to slow-downs and sabotage, it is self-evident that these substantially arise from the basis thesis that people are the source of Production Problems.

It is not suggested that the list that I have summarized is exhaustive, however, it is felt that most others which can be

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mentioned are in the last analysis variations of the above and really arise from the fact that any production unit is really a group of people working together, each of the people involved being subject to all the vagaries and failings of human beings.

### SOLUTIONS

At long last we come to the point where the "and Solutions" part of the discussion is to be considered. I wish to suggest for your consideration that there are two solutions which must be applied co-incidentally — one being of major importance and the second of somewhat lesser significance.

The first major "solution" which I intend to advance relates to the selection of personnel. To illustrate this I can remember at one time that I was quite delighted and subscribed thoroughly to the appointment to the position of supervisor of a technical department of an individual who had proved himself to be a superlative technician in the activity concerned. The appointment was not successful. Unfortunately those other characteristics of administrative ability (with all its implications) and general breadth of view were not given due consideration. To put it another way, the most skilled accountant on earth may well be the poorest Chief Accountant because the Chief Accountant doesn't do any accounting, — his job is to get a number of accounting type people to do accounting for him. If he can't successfully get people to do the work he has failed. Please, do not get the idea that this thought is original — more and more it is being recognized by various writers and others as being of vital importance, but I do suggest that all too frequently, as in the case of Planning, these principles are not accepted wholeheartedly, — by wholeheartedly I mean that deep-seated uncompromising conviction with which we accept the statement that two plus two equals four. As witness to this, all I ask you is to think of the times you have undoubtedly heard during discussions leading to some new appointment the statement: "But he hasn't had anything to do with the I.B.M. equipment and Jim has." Must we all not plead guilty to having been unduly swayed at times?

In the selection of personnel there are now many tools available among which are "aptitude tests" or "personality appraisals". Full use must be made of these, but as indicated by one of Canada's eminent practitioners during a recent discussion of Industrial Psychology it is not merely a question of

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is Bill Jones personality-wise capable of doing this job BUT it is a question of Bill Jones' capability of doing this job reporting to Dick Smith as his superior and Tom, Harry, George and Jim reporting to him with the some six other already selected people at his own level acting as production manager, chief engineer, quality control supervisor, etc. Given such a background it would appear that the advice of an Industrial Psychologist would be of significantly greater value.

Those Industrial Psychologists with whom I have had contact are very firm in emphasizing that their advice is based only on limited knowledge derived from certain tests and one or more necessarily restricted interviews. They go on to stress that their information must be supplemented by the knowledge gained during a generally much more protracted period of association on his previous job. It appears unfortunately that we can all too easily be blinded by the technical excellence of performance of an individual and thus fail to observe those characteristics which are required in the senior position.

The second "Solution" proposed for your consideration has already been referred to in a more or less specific instance. To express this in a more generalized form — methods of fairly assessing the employee's efforts should be sought and applied with the full knowledge of the employee that this is being done and will form a part of his record. For best results it would appear that a minimum time interval between the performance of the job and the advising the employee of results is desirable.

Merit rating schemes are undoubtedly a step in the right direction but usually these are only semi-annual affairs and unfortunately all too infrequently are they any more than expression of opinion — sincere and well considered though it may be. Much more study is required both in a general sense and with specific reference to various jobs in our own companies before we can consider that real progress has been made. I would like to refer back to the previously mentioned examples on the assembly lines and ask the question, — by what right can we assume that any other group of people are performing in a better manner and cannot exhibit some considerable improvement? The fact that the other group bears a different "title" — Accounting Department, Engineering Department, etc. — does not seem in itself to be of any great assurance.

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As a corollary to my second solution I suggest that there are many cases where supervisors have recognized a degree of personal inadequacy but possibly due to a lack of fortitude have hesitated in taking action until a "seniority" problem had been built up. I believe that this tendency is somewhat more prevalent in the supervisors of technical departments — not illogical in that the long training periods of engineers and accountants tend to deal exclusively with things and not people. In all other requirements the supervisor may be more than adequate. In such instances I feel that an alive Personnel Department can contribute greatly by recognizing this deficiency and supplementing the supervisor both by friendly advice and at times by forceful action.

In conclusion, gentlemen, I trust you are not too disappointed at my inability to present a concise list of Production Problems and a parallel row of labelled buttons to be pushed promptly when the trouble arises. To put over your point it is often necessary to over-simplify the problems involved, — I am well aware that I have done so, but I felt it was necessary to obtain sufficient stress to the expression of my conviction that the Problems of Production whether of radios, figures or sales is far more a problem of People — People working together than is whole-heartedly acknowledged and that more adequate and more intelligent efforts must be directed towards solutions from this point of view.

## The Need For Monthly Cost and Plant Management Sessions

By GEO. HENDERSON, F.C.I.S.

Vice-President and Comptroller, Consolidated Paper Corp. Ltd.

Top management prescribes overall company policy, but periodic management sessions provide the medium through which detail planning may be fully developed to bring about proper synchronization and a high degree of efficiency.

The author explains how this principle is applied in five areas of plant management.

My talk this afternoon will naturally reflect my experience and observations during thirty-three years association with Canada's leading industry — pulp and paper. As a matter of fact, the Canadian Pulp and Paper industry is one of the major industrial enterprises of the world. In Canada it stands first in employment, first in total wages paid, first in value of exports, first in production and first in capital investment. In 1950, Canada accounted for 54% of the world production of newsprint paper. It is interesting, when one stops to consider it, that since before the start of World War II, Canada's yearly capacity to produce newsprint has increased by 727,000 tons, whereas the combined capacity of all the other 33 producing countries has decreased by 672,000 tons (U.S.A. and Scandinavia showing slight gains). During this present year it is expected that Canada will produce almost 5½ million tons of newsprint and in addition many thousands of tons of other pulp and paper products.

The Consolidated Paper Corporation Limited with which I am associated, is one of the largest units of the pulp and paper industry in Canada.

Paper manufacturing is a process industry and therefore lends itself admirably to departmental cost accounting. In the case of an integrated newsprint mill, for instance, the first process involves the handling of wood. Hence, we have the Wood Handling Department, which is concerned with the receiving, storing, cleaning and delivering of wood to the pulping departments of which there are two — the Mechanical or Groundwood Pulp Department and the Chemical or Sulphite Pulp Department.

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Next comes the Paper Machine Department which converts the products of the former two departments — ground-wood pulp and sulphite pulp — into newsprint paper. Following the Paper Machine Department is the Finishing & Shipping Department where the paper is wrapped and then shipped to customers.

In addition to these direct process departments, there are various Service departments such as Steam, Power and General Mill or Burden Departments which include: Mill Administration, Engineering, Accounting, Stores, etc.

Against this background of the pulp and paper industry, I have been asked to speak on the need for Monthly Cost & Management Sessions.

I propose to segregate and deal with the subject under five principal sub-headings, i.e.:

1. The need for sessions concerning Work Detail Planning;
2. The need for sessions concerning Cost Control Planning;
3. The need for sessions concerning Cost Control Follow-up;
4. The need for sessions concerning Inspiration and Training;
5. General.

You will note I have omitted the word "monthly" in these sub-headings. It is irrelevant. The important thing is regularity and consistency, regardless of the length of the period. For some purposes monthly meetings might be desirable and for general cost control purposes where cost results are summed up each month, a monthly meeting is indicated. But there are situations where meetings, for specific purposes are best held at more and sometimes less extended intervals or as occasion warrants.

## WORK DETAIL PLANNING

To operate any industrial enterprise efficiently and profitably requires, among other things, that careful thought be given to all the activities vital to the existence of the Company. For every action to be taken, there should be planning in order to arrive at policies and methods which will enable the fulfilment of each task to the best advantage.

Plant Management is not directly concerned with overall company or top management policy; it is concerned, however, with planning each detail concerning the manufacturing process, in order to achieve the results for which top management is



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seeking. These details must be grouped according to the various functions or departments within the plant organization. Planning also concerns the co-ordination of the activities of these departments in their relationship one with another.

While the head of each department of a plant will no doubt do much detail planning with respect to his own particular responsibility, especially in the day-to-day operations of his department, no industry can hope to operate efficiently unless there is a complete and up-to-date understanding by department heads of what is required of them, in order that proper inter-meshing of the various functions may be brought about and maintained.

Periodic plant management sessions are the means whereby work detail planning may be fully developed to bring about proper synchronization and high efficiency.

I cannot emphasize too strongly the need for plant management, in their periodic meetings, to study all the facts in relation to the operation being carried on — all the “brothers and sisters” must be brought into full light before a comprehensive plan of operations can be evolved. A proper cost system will do much to assist in this endeavour.

## **COST CONTROL PLANNING**

It is not enough that the physical performance of the work alone be considered at the plant management session. No plant is fully efficient unless the economic aspect is considered and planned for in order that the physical result might be achieved in a way that will insure the best results to the company. Plant Management at all levels, from the Manager down through the various ranks of Supervision to the Foreman, yes, and even to the workers themselves, should be cost-minded, first — foremost — always. To plan for this state of mind is one of the prime functions of the Plant Management session. Here is the opportunity to teach department heads the competitive nature of industry under the free enterprise system — to explain to them the need for careful control of all those factors which find reflection in the statement of earnings — to inspire them to full cost consciousness and the need to carry this ideal down the line to the workers.

To achieve and maintain efficiency, progressive Management makes far reaching use of the techniques of accounting and costing.



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Costs and cost accounting then are vital elements in all effective planning. This means that cost information, giving the pertinent facts concerning each function or department of the plant, must be prepared in such a way that the full significance of each work detail is readily apparent to the department head. This cost information should not be confined to a statement of money values. Information concerning many of industry's thousands of work details, when expressed in dollars and cents figures, is of little value. Expressed in quantities, they take on greater significance. For instance, process labor, defined in terms of man hours can mean, and most often does mean, for control purposes, a great deal more than when expressed in dollars and cents; particularly so to the department head who is endeavouring to exercise effective control of his operations. In the pulp and paper industry, for example, a department head has much better control of his department when he has full knowledge of such things as, Man hours used per cord of wood or per ton of pulp or paper; k.w. hrs. used per cord or per ton; lbs. of steam used per ton, or the percentages of various kinds of raw materials used. One of the principal advantages in the quantitative expression of cost data, is in making comparison with past performance; one sees quite clearly what betterments have been attained or setbacks suffered. Dollars and cents figures very seldom give a proper comparison with previous periods because of variations in the value of the dollar.

Now, cost information to be fully effective must serve at least two purposes: first, to clearly show the goal to be reached, and secondly, to show the success obtained in reaching that goal. Essential data will be required for each department and it should also be set up to show the composite result for the plant as a whole, for the benefit of Top Management.

Progressive executives think naturally in terms of progress against goals and endeavour to instill into their organizations the spirit of Successful Achievement.

To define the goal or objective which should be reached requires carefully prepared and planned Standard Costs setting forth in quantities, percentages, ratios, or dollars and cents, exactly what the objective is for each department and how to reach it. Standard Costs do not necessarily end with mere statements of figures set up in one way or another. To be of full value in the purpose of serving as a chart or yardstick against which to guide and measure the operations of the department or

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plant, it is highly desirable that the Standards also include instructions or information to better enable correct interpretation and leave nothing to be guessed at by those who are responsible for supervising and guiding the operations.

Standard Costs provide plant management with an effective tool for day to day, week to week and month to month control of plant operations.

How are Standard Costs developed? This is where Plant Management sessions are extremely useful. The Cost Accountant, of course, should be responsible for setting the standards down on paper in logical arrangement. He will attend the Plant Management meetings with quantitative facts and figures regarding part performance, together with information about labor rates and material prices. No doubt, from data which he has already obtained, he will have prepared tentative figures for study at the plant session. At this meeting the Department Head, the man who is directly responsible for living within, or bettering, the departmental standard costs, with his knowledge of operating methods, the use of labor and use of materials, also time or job analysis studies he may have made, will contribute substantially to the build-up of the standards which are being prepared for his guidance. The fact that the department head assists in setting his standard costs, thus in part fixing his own goal, will be an inspiration, lending drive towards the attainment of the objective.

The Plant Engineer will also influence the Standards with his expert knowledge of machine and equipment performance, together with engineering and maintenance requirements. The Plant Manager (assisted by other department heads) with his overall knowledge of the plant and how each department should synchronize with others, will guide the preparation of the department standards in their final stages. These are Standards of measurement intended to represent what should be spent under normal conditions for the actual time operated and the actual volume of work done or tonnage produced. In this way, effect is given in the Standard Costs to the ups and downs of production due to general business trends — even changes due to seasonal conditions would be provided for.

This, then, is a brief description of the part Plant Management sessions can play in the preparation of Standard Costs — industry's chart and guide to effective accomplishment in the plant.

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In addition to Standard Costs progressive management will also wish to have a long-term picture of plant operations. This will take the form of an Annual Budget which will be compiled in much the same way as Standard Costs are compiled. To some extent the Annual Budget will be based on Standard Costs, though taking into consideration a definite goal of production for the year. The Budget will also take into consideration any known or anticipated departures from Standard or normal operation and make provision for them. The result should be a "plan" for the year's operations based on experience, known factors and anticipated conditions. Carefully prepared in this way, the plant budget should be an almost exact pattern of what finally transpires and should result in obtaining most, if not all, of the advantages which a preconceived plan of operations can give, such as;

Full co-operation, co-ordination and control; preventing waste of labor and materials; the proper relating of operations to business trends; disclosure of weaknesses; low costs.

## COST CONTROL FOLLOW-UP

A monthly Plant Management session with the plant manager acting as chairman and which should be attended by all department heads and superintendents will provide the occasion for regular and systematic follow-up of the accomplishments of individual departments and the plant as a whole.

Just as promptly as possible after the end of the monthly accounting period, the Cost Accountant should prepare statements showing in full detail for both month and year to date what the actual performance has been, compared to the standard performance. Copies of these statements should be handed to the department heads concerned and to the plant manager. The statements are, to the department heads what a profit and loss statement is to Top Management. The fact that a department might not have done as well as the Standard calls for, indicates a loss, whereas better than Standard performance indicates a profit. Performance equal to Standard indicates "break-even" which is commendable.

In an industrial plant, the department head is akin to a proprietor and as such has definite responsibilities for operating his department at a profit. In other words, he should keep within or better his Standard costs.

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It is essential that full cost responsibility be placed on department heads for they are the men who directly control by far the larger part of plant expenditures in the way of labor, material, steam, power, etc.

The Cost Accountant should interview each department head and discuss the monthly cost statement with him and then prepare a brief narrative report bringing out the high points of the month's activities and give reasons for failure to live within the standards.

A Plant Management session should be held promptly after the monthly cost statements and narrative report have been completed. Under the Chairmanship of the Plant Manager, Department Heads will consider the results which have been attained during the previous month and where these have fallen short of Standard, plans will, if necessary, be evolved and steps initiated to correct the situation.

Standard Costs are of little value unless proper control is established. This means constant effort on the part of each department head with frequent follow-up by the Plant Manager, climaxed by thoughtful study at the monthly meeting to bring about corrective action where needed.

Effective control of plant operations is the high purpose served by the plant Standard Costs.

## **INSPIRATION AND TRAINING**

It is unfortunate, but true, that some department heads are concerned only with keeping their departments operating without considering the need to operate within standard allowances. They give only superficial study to cost reports and statements which are presented to them daily, weekly or monthly to assist them in the exercise of efficient control of their departments. The monthly Plant Session does much to bring about a better understanding, by such department heads, of the important need to consider the economic aspect of their operations. The fact that searching questions may be asked of them at these meetings, will no doubt convince them of the need to become interested in proper cost control.

But the monthly plant session should not be thought of as being only a means of exercising control over department heads, it should be an occasion for them to obtain inspiration for still better performance of their departmental affairs regardless of how well they are already doing. It is an opportunity for the

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release of sound thinking and encouragement of initiative throughout the organization, and for the free discussion of many items with which Plant Management, at the different levels, is vitally concerned, such as:

1. Employee relations and welfare
2. Public relations
3. Employee suggestions
4. Depreciation and obsolescence of equipment
5. Plant layout
6. Methods and procedures
7. Authority and responsibility of individuals
8. Internal organization
9. Use of materials
10. Employee training
11. Development of better products, etc.

The monthly session also provides the occasion to help department heads to a better understanding of:

1. The Company's long-range objective
2. The thinking of Top Management
3. Ways and means to reach objectives
4. How they might take a more important part in the Company's present and future success.

Finally, the Plant Management session, where all department heads are gathered together for the discussion and consideration of various topics, is a splendid training ground for guiding and assisting them in the attainment of managerial ability.

## GENERAL

In some cases it may be desirable to hold Plant Management sessions more often than once a month. As a matter of fact there was a time when brief meetings were held each day at one of our plants, not to discuss cost questions as such, but rather to arrange for the complete co-ordination of departments for the next 24 hours and to report on special projects.

Sometimes weekly meetings might be found necessary or desirable. At one of our plants a weekly meeting is held with no small degree of benefit. "High Spot" costs are discussed on the basis of a weekly compilation of actual and standard costs. The weekly meeting permits quicker follow-up and corrective action where this may be required, but by and large the monthly meeting, with proper intermediate follow-up on the part of the plant

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manager has proven, in most cases, to be all that is required to bring about a high state of plant efficiency.

You will be interested in another type of meeting which has proven effective where a company may have several plants carrying on productive operations of a more or less similar nature. Such a meeting would be attended by executive officers and by the plant managers who would bring with them those department heads who are best able to discuss the subjects on the agenda. The chairman of the meeting would be the executive officer in charge of manufacturing operations.

Such a session or meeting need not be held as often as plant sessions. Bi-monthly or quarterly should be sufficient. At this meeting comparative figures for the various plants in the organization are studied. For this purpose a monthly comparative report of costs at various plants is prepared and circulated to all concerned. This report brings out all the High Spot items for the various plants and gives explanations. It is the basis of cost studies at the bi-monthly or quarterly meeting. You can appreciate that each plant will learn a great deal from the results of similar operations at the other plants. The whole organization therefore benefits from the broader experience which is brought into focus. All the problems and all the projects affecting individual plants or the organization as a whole can be discussed at this periodic meeting and proper planning done in connection with them.

Still another type of gathering which is of much benefit to a Company operating several plants is that of the heads of similar departments. These meetings may take place, say, twice a year and rotate between the various plants. The head of the department at the Home plant should be the Chairman. Subjects discussed will have to do with the particular department concerned, such as: how the highly efficient results being achieved at one plant may be attained at the others; suggestions for improvements in equipment; methods and procedures, etc. Action recommended by department heads at meetings of this kind should have proper approval from higher Management before being put into effect.

The outstanding fact behind all the plant and management sessions to which I have referred, is that everything which legitimately goes on has or should have an underlying cost control or profit motive.

## The Role of Research in Industry

By R. H. RIMMER

The word "research" has been very much overworked in the last few years, not only overworked, but expanded to cover a multitude of undertakings. On the one hand we have developments like atomic energy, television, radar, penicillin and other new methods for treating disease, and to come closer home to Kingston, nylon, which are the results of research. The other extreme is the so-called research done by the movie industry to see that the scenery and costumes used are reasonably authentic for the time portrayed, or the man who claims he is doing traffic research when he is simply standing on the street corner counting cars as they go by to determine the density of traffic at that particular spot.

There are many definitions for the word "research", but I believe the following is fairly well accepted in scientific circles:

"Research is the observation and study of the laws and phenomena of Nature and the application of these findings to new devices, materials, or processes, or to the improvement of those which already exist."

Research is generally divided into two main classifications. One is called fundamental or theoretical, and the other industrial, applied, or practical. Fundamental research is the investigation of the laws and phenomena of Nature and the interpretation of information on their operation. Industrial or applied research is the working out of a programme with a definite practical objective. Research is usually carried out in one of four types of organizations —

- Universities
- Research foundations
- Governmental laboratories
- Industrial organizations

Universities usually carry out fundamental research and industrial organizations applied research, with research foundations and governmental laboratories doing both. However, the present-day tendency is for industrial organizations, particularly the larger ones, to carry on considerable fundamental

An address before the Kingston Chapter.



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research, while some of the universities are taking on more applied research investigations. Our scientific advances have been so rapid in the last two decades that the applied research of to-day was very fundamental yesterday.

My subject was stated as "The Role of Research in Industry", so it might be well to state in general terms what an industrial research organization does. None should know better than a society of industrial and cost accountants that an industrial organization, to survive, must make a profit, therefore, the research division of an industrial organization must directly or indirectly help in the making of this profit. What does it do to assist? Many lists have been proposed, but I believe the following covers most of the field —

1. Improve the quality of products.
2. Lower costs.
3. Help in the development of new uses for available materials or processes.
4. Develop new materials, processes, or equipment for old or new markets.

Research is really nothing new. Man is by nature inquisitive. We always want to know what lies over the next hill. The first person who learned to produce and control fire, or the man that first used a wheel in transportation certainly qualified as doing research. The only thing new about research is the system that has been evolved for doing it. If we go far enough back in the development of our society we find that man existed almost entirely by his own individual efforts, — he secured his own food, clothing, and shelter. Gradually the system developed whereby certain individuals would perform one job and exchange the results of their labour for that of another person who worked on a different task. By a process of natural selection people on the average did what they were best qualified to do, or what they preferred to do. Our so-called capitalistic system was developed also, and this meant that one person who was more industrious or capable than another would acquire as his reward more of the fruits of total labor. Most businesses as they developed were small and relatively uncomplicated. The owner of any business, if he was making a product and was of a particularly inquisitive turn of mind tried to make a better product, lower his cost, use some other raw materials, or make new products. He was doing



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applied research work. At the same time he was doing this he was also probably his own accountant, personnel director, and performing a host of other jobs. The standard of living increased due to the combined efforts of these aggressive small organizations, and as more people were able to acquire more things the successful businesses grew in size and to the point where it was necessary to delegate various types of work to special groups, and industrial professions began to appear. In the trades, for example, we had carpenters, brick masons, machinists, and a host of other trades. At the same time, people began to study more, and in due course we had universities turning out mechanical, electrical, civil, and other types of engineers, to mention only a few. As all this was developing, the keeping of records became too much for the old-fashioned bookkeeper, so he became an accountant, or tax specialist, or interested in some other phase of record keeping. With an expanding organization, I rather imagine the decision as to what should be made, and how it should be made, along with the determination of the profits, and use to which the profits should be put, were responsibilities that the individual owner would delegate to someone else last. That is one of the reasons, I think, that some people believe industrial research is something new, rather than just a different way of organizing to carry on more efficiently (we hope) what has been done for centuries. Another contributing factor to the present type of research organization is the complexity of the problems that must be solved. For example, many years ago the manufacturer turning out a wagon used relatively few materials, a little steel and the balance wood, unless he was really up-to-date and painted his product. Now contrast that with the modern truck. One man could cope with the technical problems of making a better wagon, but making a better truck requires the services of many specialists. It isn't necessary for an industrial organization to have a separate research division to make new discoveries and inventions. The growth of separate research divisions as such is an evolution in industrial management, just as that of personnel departments, traffic departments, and of other such divisions to carry out special functions in a large organization. It has been proven on many occasions that when qualified to do a certain type of work, and interested, a person will do more in the same total of hours if given that job

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on a full-time basis than on a part-time basis. Thirty years ago there were relatively few industrial organizations with research set up as a separate department. Now there are several thousand on the North American continent. Industrial research in the United States expanded ten times from 1920-1945.

What are some of the results of this expenditure on research? Perhaps I should emphasize that industrial research is only one member of the industrial team. The results of fundamental research, and the applied research that must follow, will never show a profit on the balance sheet until the final consumer product is marketed. Therefore, after the research and development work are done, it is necessary to engineer and build the facilities needed for manufacturing, supply the operating organization to manufacture the article at a cost which will allow the sales organization to sell at a profit as determined by you accountants. Now, co-ordinating all of these activities there must be a capable and aggressive management. To use an expression borrowed from the atomic physicists, if we consider an industrial organization as a chain reaction, we could say the research organization triggers the reaction. If one asks: "How Large a Role Does Research Play on This Industrial Team?" it is almost impossible to answer the question except in generalities.

The President of the DuPont Company, in an interview in September 1949, pointed out that 60% of their sales at that time arose from products which were not in existence prior to 1928. We have a good example of a modern industry that grew out of research in a relatively short time here in Kingston. I refer to the Nylon plant. This grew out of fundamental research work carried out by the DuPont Company, but it took 11 years and considerable expenditure before nylon was a commercial article. Not all research works out as spectacularly as nylon did, but a sufficient number of investigations do, so that industrial organizations are more and more willing to back the field, knowing that if only a certain percentage pays off the investment in research is still justified.

Research work is very similar to prospecting in some of its aspects. All Canadians are reasonably aware of the importance of prospecting to the Canadian mining industry and economy. The prospector, if he is successful, locates a mineral deposit, and if he follows the many laws and regulations can stake out a

## THE RULE OF RESEARCH IN INDUSTRY

claim which entitles him to the ownership of the mineral property. After this step there follows the process of developing the property which usually requires considerable time and expenditure, but if the mineral is really present the entire undertaking usually pays off. The research man can be compared with the prospector. If he is successful and makes a new discovery his first step is to file a patent application. This protects his work just as filing of the claim protects the prospector. Then follows the development of the idea, and if it is worthwhile, the construction and operation of a plant producing a new commercial article. If it were not for our present patent system, with its protection of inventors for a limited period of time, it is very doubtful if our standard of living would have reached its present high level. As you know, a patent is in force for a definite number of years only, so if any individual or organization is to benefit financially from their discoveries they must push development and use of the idea with the utmost vigour.

The comparison of research with prospecting is quite correct from one point of view, but we can and should also compare an investment in research with an insurance policy. All business organizations carry Fire, Flood, Tornado, and other types of insurance which will enable them to replace their physical plant if destroyed. While it is not as rapid as a total fire loss, failure to keep pace with competitors and competitive products can just as surely put a company out of business. Therefore, an aggressive research organization working to lower cost, improve quality, and create new uses, is an insurance policy guaranteeing that the company will stay in business.

Modern industrial research organizations are industry's answer to the complexity of our modern industrial world. Dr. E. C. Achter, President-Director of the Pineapple Research Institute, said:

"In a civilization making full use of applied science you have to run fast to stay where you are, if you want to move ahead you have to run faster."

The role of modern research in industry is simply one member of the industrial team helping an organization to run faster in the present industrial race by devoting its entire energy to the study and application of the laws of Nature as they apply to industry's needs.

## « STUDENT SECTION »

### COST ACCOUNTING

Comments by A. V. HARRIS, C.A., R.I.A.

#### QUESTION 1 (9 Marks) 1950 EXAMINATION PAPER

"C" Company has infringed upon the patent rights of "G" Company. A lawsuit resulted and the court ordered "C" Company to pay all profits on the infringement to the owner of the patent, "G" Company. In establishing the costs, "C" Company includes an item "Interest on Investment", in accordance with their normal accounting procedure. State the arguments for and against the inclusion of this item in the manufacturing costs generally.

#### SOLUTION TO QUESTION 1

*Arguments in Favour of Including Interest on Investment as a Cost of Production.*

- (a) The Economic Theory of Profits — that profits represent the balance remaining after deducting the costs of land, labour, and capital — that interest is not a profit but a charge for capital, regardless of who owns that capital.
- (b) The Selling Price must provide for interest on Capital Investment.
- (c) Comparative Costs — that the inclusion of interest is essential for setting up comparisons between
  - (1) Costs of manufacture and of buying on the open market.
  - (2) Costs of manufacture by expensive machinery and by manual labour.
  - (3) Costs of manufacture by new and by old machinery.
  - (4) Costs of owned and of leased plants.
- (d) Complete cost where time is an important element — where processes are long, or where seasoning, etc., is necessary.
- (e) Determining manufacturing and selling policies — that interest on plant and on inventories affect policies, more especially during slack periods.
- (f) Uniform cost determination in Trade Associations.

*Arguments Against Including Interest on Investment as a Cost of Production.*

- (a) Interest a Profit — not an expenditure, but a division of profits.
- (b) Anticipation of Profits and inflation of inventories — that unrealized profits are set up for interest included in inventories on hand. (May be rectified on statements by deducting proper portion of interest). (May charge from Inventories and Surplus).
- (c) Not necessary for Comparative Costs — that in many cases interest is not necessary for proper comparisons and that where necessary it may be set up on subsidiary statistical records.
- (d) Difficulty of determining interest rate to be used.

## COST ACCOUNTING

- (e) Difficulty of determining amount of "Investment" on which interest is to be commuted.

### COMMENTS, QUESTION 1

This question was not answered satisfactorily by most candidates — as is usual for questions on theory in the Cost Accounting Papers. While the examiner would have been satisfied to find that the student knew the majority of the "pros" and "cons" of this very old controversial question — it appears that most students knew only about one "pro" and two or three "con" arguments. Average mark of all students was 2.5.

## GENERAL ACCOUNTING

Comments by J. D. Campbell, C.A., R.I.A.

### ACCOUNTING II

#### QUESTION 4 (5 Marks) 1950 EXAMINATION PAPER

The following operating results were presented for Departments A, B and C for the year ended 31st December, 1949.

	A	B	C	Total
Sales .....	\$600,000	\$400,000	\$200,000	\$1,200,000
Costs:				
Labour and materials .....	\$200,000	\$150,000	\$120,000	\$ 470,000
Overhead				
Fixed .....	200,000	160,000	80,000	440,000
Variable .....	50,000	30,000	20,000	100,000
	<u>\$450,000</u>	<u>\$340,000</u>	<u>\$220,000</u>	<u>\$1,010,000</u>
Net profits (loss*) .....	<u>\$150,000</u>	<u>\$ 60,000</u>	<u>\$ 20,000*</u>	<u>\$ 190,000</u>

Management has approached you with the contention that Department C should be abandoned as it shows a loss.

#### REQUIRED:

Present your reply to management setting out the net profit of the business if this were done.

#### SOLUTION

The elimination of Department "C", other things being equal, will require the remaining departments to carry the item of fixed overhead which at present is being borne by Department C. As long as the loss suffered by Department C does not exceed the fixed overhead it would be inadvisable to discontinue Department C.

The net profit, if Department C were discontinued, would be \$130,000 or a reduction of \$60,000.

#### COMMENTS:

This question was fairly well answered. The student who failed to recognize the fact that the fixed overhead represented a charge which would not be eliminated by discontinuing Department C, were given no credit in presenting their answer. Several students had no conception as to the nature of the overhead charges as between fixed and variable.

## COST AND MANAGEMENT

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